

Mechanical Engineering Seminar Series

March 17, 2026, 11:00AM

Dean's Conference Room, E-203E

Title: E-FIELD Flames on the ISS, Combustion and Gas Hydrates Research

Dr. Yu-Chien (Alice) Chien
University of California, Irvine

Abstract: Electric Field Effects on Laminar Diffusion Flames (E-FIELD Flames) is one of the Advanced Combustion via Microgravity Experiments (ACME) of the National Aeronautics and Space Administration (NASA). The E-FIELD Flames experiment studies a hydrocarbon flame jet to determine how an electric field leads to an electric body force and a resultant ion-driven wind when the normal 1-g buoyant force is not participating in the process. The E-FIELD Flames experiment was boarded onto the international space station on March 14th, 2018 and was accomplished in November of the same year. The goal of the study is to expose the physico-thermo-chemical processes when an electric field is applied without gravitational effect. The results show that the flame is most compact at saturation while the measured voltage to current characteristic (VCC) curve demonstrates parabolic behavior after saturation which differs from observations in 1 g on Earth.

The second part of the talk will briefly survey the current research developing in both the Keck Foundation **Deep Ocean Power Science Laboratory** (DOPSL) and the **Lasers, Flames & Aerosols** Research Group (LFA) at UCI, including high pressure carbon storage and conversion for gas hydrate, ember accumulation study during wildfire, Particle Imaging Velocimetry technique for bubble, 50 c.c. engine emission study, hot air balloon combustion study, holographic reconstruction for spray imaging in optical dense media, molecular dynamics simulation for hydrate sequestration.

Bio: Dr. Chien is the Director of LFA, and Project Scientist (Full), at UC Irvine. She is currently the principal investigator (PI) for project with NASA, NIST and DOE. She joined the project scientist position at UCI in 2015 after receiving her Ph.D. in Mechanical and Aerospace Engineering in 2014 from UCI. She conducted the realtime remote operation on earth for the NASA E-FIELD Flames experiments aboard the international space station (ISS) in 2018. She is the chair of the UCI Combustion Institute Summer School (UCI-CISS) in 2023 and faculty fellow at the NASA Glenn Research Center (GRC) in 2024. She is currently serving as a Committee member of Biological and Physical Sciences (CBPSS) for the National Academy of Science (NAS), board member at large of Western States Section Combustion Institute (WSSCI), board director and the CST special issue editor of Institute for Dynamics of Explosions and Reactive Systems (IDERS), secretary of the AIAA Orange County section.